

Management Recommendations for
Dermatocarpon luridum (With.) Laundon

version 2.0

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SUMMARY

Species: *Dermatocarpon luridum* (With.) Laundon

Taxonomic Group: Lichens (Aquatic)

ROD Components: 1,3

Other Management Status: None

Range: *Dermatocarpon luridum* is known from only 19 sites in the range of the Northwest Forest Plan, seven in Washington, nine in Oregon and three in California. It occurs in Washington on the Gifford Pinchot, Okanogan, Olympic, and Wenatchee National Forests; Olympic National Park and in the San Juan Islands; in Oregon, on the Umpqua National Forest and Silver Falls and Mayer State; and in California, in the Klamath National Forest and Humboldt County on land of unknown ownership. The species is broadly distributed globally, but uncommon to rare in the Pacific Northwest.

Specific Habitat: This aquatic lichen grows on rocks, small boulders, and bedrock, submerged or seasonally emergent, adjacent to or in clear mountain streams between 105 and 1980 m elevation (1000-6500 ft), where it can be locally abundant. It is present on seepy terraces, and in streams and rivers with red alder, Douglas-fir, western hemlock and riparian vegetation ranging from young stands to old-growth, and in streams in alpine meadows.

Threats: The major threats to *D. luridum* are loss of populations resulting from activities that harm the population or affect its habitat. Altering stream conditions including water quality, chemistry, temperature, light regime, level, opacity, or sediment load, changing microclimatic conditions by altering the riparian canopy creates potential threats. Building and decommissioning roads (including culvert placement and removal), restoration activities, and fish enhancement projects using instream structures are threats. Activities upstream could impact sites downstream.

Management Recommendations:

- Because there may be dispersal limitations between streams, maintain *D. luridum* in each stream where it occurs.
- Maintain water quality parameters necessary for survival of *D. luridum*.
- Maintain riparian canopy conditions necessary for survival of *D. luridum*.
- Evaluate effects of treatment of riparian vegetation in populated stream reaches and the potential for reducing bank stability and increasing sediment input.

Information Needs:

- Determine if this species meets the criteria for being closely associated with old-growth.
- Determine stream conditions and range of riparian canopy conditions necessary for survival of *D. luridum*.

Management Recommendations for *Dermatocarpon luridum*

I. NATURAL HISTORY

A. Taxonomy and Nomenclature

Dermatocarpon luridum (With.) Laundon was described by Laundon in 1984.

Synonyms:

Dermatocarpon aquaticum (Weis) Zahlbr.

D. fluviatile (Weber) Th. Fr.

D. weberi (Ach.) Mann.

B. Species Description

1. Morphology

Dermatocarpon luridum is a freshwater aquatic, foliose, multi-lobed umbilicate lichen with a flabby texture, especially when wet (Figure 1). Upper surface is a drab brown when dry, turning bright green when wet; lower surface dark brown with occasional paler patches, mostly smooth but occasionally weakly wrinkled or papillate (Goward *et al.* 1994). The upper surface is commonly speckled with tiny black dots, which are perithecial openings (Purvis *et al.* 1992).

Technical Description: Thallus foliose or cushion-forming squamulose, more or less umbilicate, the squamules or individuals generally > 3 mm broad but mostly < 2 cm broad, often closely packed or shingled; upper surface usually not pruinose, light to dark brown, green when wet; lower surface smooth or with roundish bulges from the perithecia, or weakly wrinkled; perithecia common; spot tests negative (McCune and Geiser 1997).

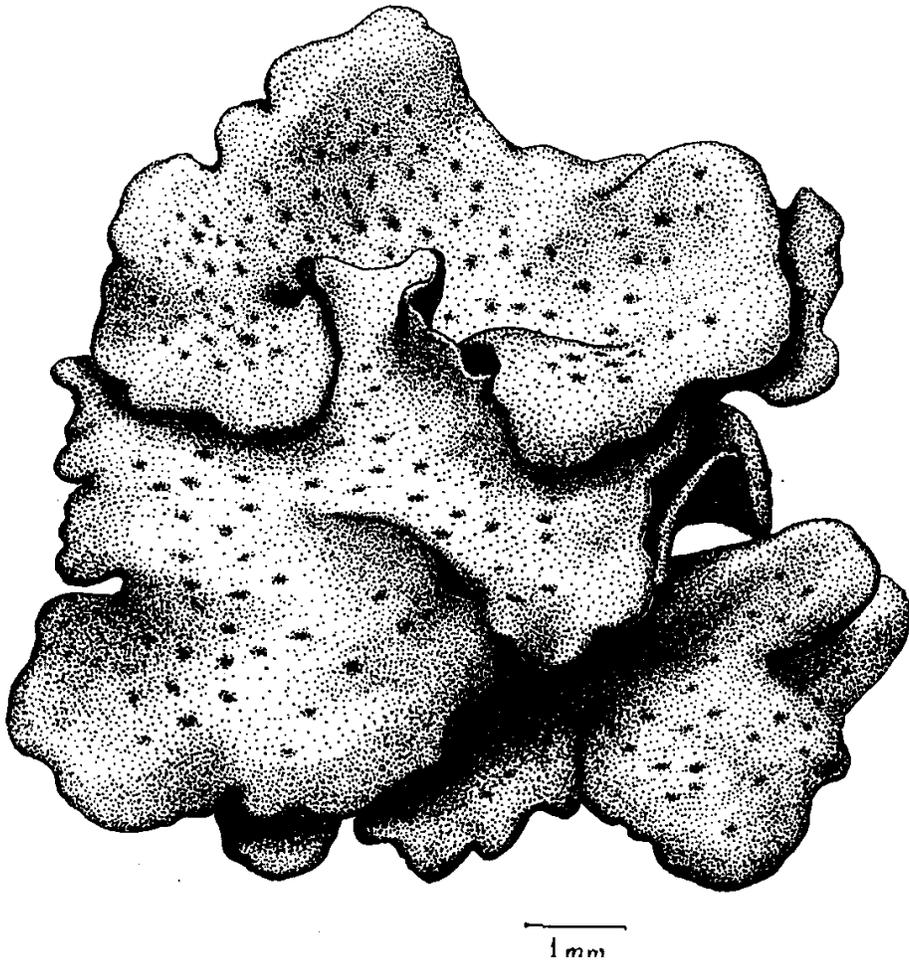
2. Reproductive Biology

Dermatocarpon luridum reproduces sexually by producing fungal spores in perithecia. It may reproduce vegetatively by fragmentation of thallus lobes, which could drift to new sites and reattach to rocks. Aquatic invertebrates that graze on this lichen and ingest spores could also be dispersal vectors, as could downstream movement of colonized rocks.

3. Ecological Roles

Dermatocarpon luridum is an aquatic species, growing either submerged or seasonally emergent, immediately adjacent to higher order freshwater streams. It appears to be more tolerant to periods of desiccation than other aquatic lichens, perhaps because of the high humidity it receives during summer nights at high elevations. It is a good indicator of water quality and constancy of stream flow and may be particularly sensitive to siltation; it also provides habitat

Figure 1. *Dennatocarpon luridum*, line drawing by Alexander Mikulin.



for aquatic invertebrates (USDA and USDI 1994a). Declines in aquatic lichen populations could adversely affect these invertebrates, which in turn provide food and nutrients to fish and other components of aquatic and terrestrial ecosystems.

C. Range and Known Sites

Dermatocarpon luridum has rarely been collected in the range of the Northwest Forest Plan, where it is known from only 19 sites. In Washington, it is known from near Tatie Peak, Pacific Crest Trail, Okanogan National Forest (Okanogan County); on Brown Island (San Juan County) on land of unknown ownership; near Solduc Hot Springs (Clallam County) and Paradise Valley (this site may be in the Olympic National Forest, but needs confirmation); on the East Fork Lewis River and one of its tributaries, Gifford Pinchot National Forest (Skamania County); and in Olympic National Park (Jefferson County); and near Vantage (Kittitas County). In Oregon, it is known from Eagle Creek near the fish hatchery, Mt. Hood National Forest (Clackamas County); near Hog Lake (Lincoln County); on the North Fork Umpqua River (Douglas County); and in the North Fork of Silver Creek, Silver Falls State Park (Marion County). In California, it is known from Marble Mountains Wilderness, Klamath National Forest (Siskiyou County); near the top of Big Hill on the Hoopa Indian Reservation; and at Hayden Flat Campground (Trinity County) on land of unknown ownership. Globally, *D. luridum* has a broad distribution. It occurs in northern and western Britain and Ireland, in New Zealand (Purvis *et al.* 1992), and in temperate to arctic regions in the Northern Hemisphere where it is uncommon in the Northwest Territories and frequent throughout British Columbia below the alpine zone (Goward *et al.* 1994). It is common in eastern North America, and uncommonly collected in the Rocky Mountains (McCune and Geiser 1997), British Columbia (Goward *et al.* 1994), and southeastern Alaska (Geiser *et al.* 1998). California sites may represent the southern limits of its range in North America.

D. Habitat Characteristics and Species Abundance

In the range of the Northwest Forest Plan, *D. luridum* grows between 105 and 1980 m (1000-6500 ft) on rocks, boulders, and bedrock in streams, rivers, or seeps, usually submerged or inundated for most of the year. In larger rivers with high flows, it grows on the sides and downstream edges of in-stream bedrock, where it apparently receives some protection from the direct force of the water. Adjacent riparian vegetation includes red alder (*Alnus rubra*), Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*) and maple (*Acer* spp.), and subalpine or alpine meadow vegetation. *Dermatocarpon luridum* can be locally abundant, although its distribution in the range of the Northwest Forest Plan is scattered and the species may be rare. The lack of records in our area could be because it is reaching the southern limits of its range and is truly rare, specimens have been misidentified because of taxonomic confusion in the genus, or it has been under-collected.

II. CURRENT SPECIES SITUATION

A. Why Species Is Listed Under Survey and Manage Standard and Guideline

Dermatocarpon luridum was considered at risk under the Northwest Forest Plan because of its rarity and limited distribution in the range of the northern spotted owl (USDA and USDI 1994a). At the time of the FEMAT viability analysis, this species was known from only one site (USDA and USDI 1994a and 1994b).

B. Major Habitat and Viability Considerations

The major viability consideration for *D. luridum* is loss of populations resulting from management activities which harm the populations or affect their habitat.

C. Threats to the Species

Threats to *D. luridum* are those actions that alter water quality--including chemistry, temperature, light regime, level, opacity, or sediment load--or alter microclimatic conditions associated with the riparian vegetation and stream-bank stability. Building and decommissioning roads (including culvert placement and removal) and restoration activities may also pose a threat by directly removing or manipulating occupied substrate or by generating short-term sediment pulses when operating upstream of colonized stream segments. Run-off of fertilizers could also threaten some populations. Aquatic ecosystems are particularly responsive to chemical stress because pollutants tend to be well distributed throughout zones of active mixing (Ford 1989). The Hayden Campground site on Shasta Trinity National Forest is heavily used by recreationists.

D. Distribution Relative to Land Allocations

All known sites of *D. luridum* on federal land within the range of the Northwest Forest Plan are in Riparian Reserves. Several sites, particularly historic ones, are vague and do not have adequate location information. The adjacent land allocations need to be determined.

III. MANAGEMENT GOAL AND OBJECTIVES

A. Management Goal for the Species

The goal for the managing of *Dermatocarpon luridum* is to assist in maintaining species viability.

B. Objectives

Manage known sites on federal lands by maintaining habitat, forest structure, occupied and potential suitable substrate, and microclimate conditions associated with *D. luridum*.

IV. HABITAT MANAGEMENT

A. Lessons from History

No specific lessons from history about *D. luridum* have been identified.

B. Identifying Habitat Areas for Management

All known sites of *D. luridum* on federal land in the range of the Northwest Forest Plan are identified as habitat areas where these management recommendations should be implemented. A habitat area for management is defined as suitable habitat occupied by or adjacent to a known population.

C. Managing in Habitat Areas

Although *D. luridum* is restricted in its ecological distribution, there may be certain areas where it is locally common. If a population of *D. luridum* occurs in a project area, several factors should be evaluated before proceeding with actions that could adversely impact individuals. Evaluate the importance of that population in relation to other known sites, and the contribution of that population to species viability. Consider the landscape and ecological context of the population, factors such as the location of the population in relation to other known populations, relative isolation of the population, ecological conditions at the site and how they compare to other known sites (typical or atypical), areal extent of the population and abundance of the lichen within the local population, and availability of potentially suitable habitat in the area.

Each local population should be maintained intact, however it may be acceptable to impact a small percentage of known individuals at a particular site if it has only minimal impact to the integrity of the local population. Special consideration should be given to populations near the edge of the range of *D. luridum* and in watersheds where it is rare and of limited distribution.

After evaluating these considerations, and if a decision has been made to impact individuals in a project area, apply the following mitigation measures. Visit the site with a project coordinator to determine if proposed actions can be shifted up or downstream so large concentrations of individuals are not impacted. If impacts are unavoidable, determine if any of the colonized rocks are small enough to be transplanted to suitable habitat above the project area. Transplant as many colonized rocks as possible, and monitor their vigor (Derr 1998).

- Because dispersal may be limited between streams, maintain *D. luridum* in each stream where it occurs.
- Determine the extent of local population with a site visit.
- Maintain habitat for the species at known sites on federal lands by maintaining stream conditions including water quality, chemistry, temperature, level, opacity, low sediment levels, and stream-bank stability and maintaining microclimatic conditions (e.g., light regime) associated with the riparian vegetation.

- Reduce sedimentation into populated streams by minimizing impacts of road building, maintenance, restoration, and decommissioning activities, including culvert placement and removal.
- Evaluate upstream activities that could harm downstream populations.
- Evaluate impacts of riparian vegetation treatments, and the potential for altered bank stability, sediment and nutrient input, and how known sites of *D. luridum* could be affected by those activities.
- Avoid the use of fertilizers and herbicides adjacent to populated streams, including upstream reaches.

D. Other Management Issues and Considerations

Dermatocarpon luridum may provide habitat for aquatic invertebrates (USDA and USDI 1994a). Declines in populations could affect ecological functions important to salmon and other components of aquatic and terrestrial ecosystems. *Dermatocarpon luridum* is a good indicator of water quality (USDA and USDI 1994a) and may be sensitive to changes in water chemistry, temperature, light regime, level, opacity, or sediment load.

V. RESEARCH, INVENTORY, AND MONITORING NEEDS

The objective of this section is to identify opportunities to acquire additional information which could contribute to more effective species management. The content of this section has not been prioritized or reviewed as to how important the particular items are for species management. The inventory, research, and monitoring identified below are not required. These recommendations should be addressed by a regional coordinating body.

A. Data Gaps and Information Needs

- Revisit known sites to verify the status of their populations, determine the extent of the populations and abundance, and characterize habitat conditions.
- Determine the natural range of riparian canopy conditions necessary for survival of *D. luridum*.
- Determine if *D. luridum* meets the criteria for being closely associated with late-successional and old-growth forests.

B. Research Questions

- What are the dispersal rates and mechanisms of *D. luridum*?
- Does this species disperse between streams, and if so, what are the vectors?
- Which habitat characteristics and ecological conditions are necessary for establishing *D. luridum* propagules and survival of established thalli?
- In colonized streams, how does cover of *D. luridum* fluctuate seasonally, annually, or between flood events?

- Can *D. luridum* survive transplanting of colonized rocks to different parts of the parent stream and to different streams?
- How should populations be distributed in a stream to optimize recolonization into lower stream reaches?
- How do *D. luridum* and aquatic insects interact?
- What ecological roles does *D. luridum* play in aquatic and adjacent terrestrial ecosystems?
- Do refugial populations colonize lower stream reaches?

C. Monitoring Needs and Recommendations

- Monitor populations where road building or decommissioning (including culvert removal or placement) or restoration activities occur.
- Monitor streams for dispersal of *D. luridum* where it has been reintroduced.

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